

## TIME CRITICAL DIAGNOSIS SYSTEM OVERVIEW AND FACT SHEET

*Missourians expect timely and appropriate emergency medical treatment when suffering from an injury, stroke or heart attack, specifically ST-Elevation Myocardial Infarction (STEMI). Missouri has launched an exciting new initiative—The Time Critical Diagnosis System—to improve health outcomes for trauma, stroke and STEMI patients.*

### INJURY-TRAUMA<sup>1</sup>

#### The Problem:

- Trauma is the fourth leading cause of death in Missouri.
- It is the most frequent cause of visits to the emergency department with greater than half a million visits in 2006.
- Injuries account for the second highest total for inpatient hospital charges—\$2 billion in 2006.
- Compared to the US, while Missouri has lower rates of emergency department visits for all three major categories of injuries—unintentional (accidental), assault and self-inflicted; it unfortunately has death rates from injuries that exceed the US rates for unintentional injuries, suicides, falls, and motor vehicle injuries.
- It is also noteworthy that Missouri's death rates for unintentional injuries have increased 25 percent between 1991 and 2006, and even more alarming, our death rates for unintentional fall injuries have increased 73 percent.
- There are gaps, particularly in rural areas of Missouri, for timely access to a trauma center.

#### The Solution:

- Research clearly shows that trauma center designation and accreditation through a formal system improves patient and hospital outcomes compared to a voluntary system.<sup>2,3</sup>
- Missouri has 29 designated trauma centers that are integrated into the continuum of care, including prevention and rehabilitation and operate as part of a network of trauma-receiving hospitals.<sup>4</sup> The process for center designation has been in place since the early nineties.
- In order to assure access for timely, definitive treatment, regardless of where a Missourian is injured, many trauma health care experts and partner groups have joined together to address these gaps as part of the work to create the Time Critical Diagnosis System.

**Trauma** is a tissue or organ injury or both resulting from the transfer of energy from the environment. Examples of common types of injuries that require trauma care include falls, motor vehicle accidents, assault, abuse, burns, poisoning, and over-exertion.



## ST-ELEVATION MYOCARDIAL INFARCTION (STEMI)

### The Problem:

- Heart disease, including STEMI, is the leading cause of death in this state.<sup>5</sup>
- Heart and circulation diagnosis was the highest total of inpatient hospital charges, at \$4.2 billion in 2006.
- In 2004, Missouri's heart disease death rate was an alarming 13.5 percent higher than the national rate.
- Missouri was in the bottom ten (45 out of 52) in coronary heart disease death rates in state comparisons.<sup>6</sup>
- The prevalence of heart disease was higher than the national average as Missouri ranked 9th among the 50 states in heart disease prevalence in 2005.<sup>7</sup>

### The Solution:

- Specific therapies, administered rapidly (now approaching within 90 minutes of symptom onset) to STEMI patients have been proven to reduce mortality and disability.<sup>8,9</sup>
- Missouri's organized trauma system provides a model for organizing an integrated and coordinated approach for care of the STEMI patient.
- The recently enacted state laws provide the Department of Health and Senior Services the authority to promulgate regulations to create designated STEMI centers that meet standards to provide definitive and timely treatment for STEMI patients. (RSMo 190.241)
- The state law also stipulates that "patients who suffer a STEMI...shall be transported to a STEMI center." (RSMo 190.243)

A **STEMI** is a type of heart attack, for which impaired blood flow to the patient's heart muscle is shown by the ST-segment elevation, in ECG analysis. A STEMI is one type of heart attack that is a potentially lethal condition for which specific therapies, administered rapidly, reduce mortality and disability. The more time that passes before blood flow is restored, the more damage that is done to the heart muscle.

## STROKE

### The Problem:

- Stroke is the third leading cause of death in the state.<sup>10</sup>
- In 2004, Missouri's stroke death rate was 11 percent higher than the national rate.
- Unfortunately Missouri ranked low (40 out of 52) in the comparison of stroke death rate between states.
- Missouri was ranked 7<sup>th</sup> in stroke prevalence.
- For those that experience a new or recurrent stroke each year, approximately 23 percent will die, 15 percent to 30 percent will be permanently disable and 20 percent will require institutionalization during the first three months post-stroke.<sup>11,12</sup>
- Only a small percent of ischemic stroke patients get definitive care within the 3 hour window recommended.

### The Solution:

- Prompt treatment (within 3 hours of symptom onset) for acute ischemic stroke reduces disability and improves outcomes.
- As is the case for STEMI, the recently enacted state laws provide the Department of Health and Senior Services the authority to promulgate regulations to create designated stroke centers that meet standards to provide definitive and timely treatment for stroke patients. (RSMo 190.241)
- The state law also stipulates that "patients who suffer a stroke shall be transported to a stroke center."

**Stroke** is a sudden brain dysfunction due to a disturbance in blood flow to a patient's brain. The resulting impairments include but are not limited to paralysis, slurred speech, and/or vision loss. Ischemic strokes account for approximately 80-87 percent of all strokes and are typically caused by obstruction of a cerebral blood vessels. Hemorrhagic strokes account for the remaining strokes and are typically caused by rupture of a cerebral artery.

## MISSOURI RESPONDS

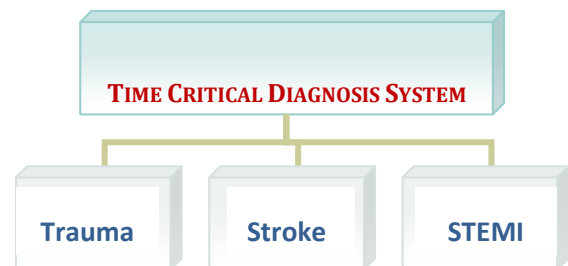
Impressive efforts have combined to improve statewide, coordinated emergency medical care services through the Time Critical Diagnosis System.

- Missouri is the first state to integrate common processes for the time critical conditions –trauma, stroke, and STEMI, a potentially fatal form of heart attack. All of these conditions require quick assessment, diagnosis and treatment by emergency medical personnel and a facility that can provide timely, definitive care to minimize risk for preventable complications and death.
- Missouri enacted laws (RSMo 190.200-190.245)<sup>13</sup> in 2008 that created the Time Critical Diagnosis (TCD) System through which emergency medical care is provided for patients who require time sensitive diagnosis and care.
- Two statewide task forces, one for trauma and one for stroke and STEMI, were formed and compiled recommendations on how to establish the TCD system and improve emergency medical care for stroke, STEMI and trauma. (Stroke and STEMI Report issued 8/08 and Trauma Report expected fall 2009 [http://www.dhss.mo.gov/TCD\\_System/index.html](http://www.dhss.mo.gov/TCD_System/index.html) )
- The State Advisory Council for Emergency Care, Trauma Subcommittee/Trauma Task Force and Stroke and STEMI Implementation Work Groups have been actively engaged in forming the regulations; protocol and guidelines for classification of trauma, stroke and STEMI patients; field triage and emergency medical service protocols; regulations for designated centers; and planning for professional and public education and quality assurance and performance improvement. Over 400 individuals have participated since fall 2008.
- The American College of Surgeons conducted a consultation visit of Missouri's trauma system and is forwarding a report on recommended actions to improve the delivery of trauma care as part of the TCD system. (Report expected Fall 2009)
- Regulations have been drafted to create Stroke and STEMI centers (Levels I-IV) and Level IV Trauma Centers, adding to the existing Levels I-III.

- Sources for funding to provide core staff to support the designation process and administrative supports have come from a range of sources including the State of Missouri, Missouri Foundation for Health, Centers for Disease Control and Prevention and other grants. Funding sources to provide sufficient supports to upgrade and sustain core infrastructure continues to be sought for this complex system of care.

## THE TCD SYSTEM IMPROVES CARE

The TCD system is a comprehensive, coordinated statewide and regional network that delivers emergency medical care under one banner rather than through three separate systems.



The TCD system represents the continuum of services beginning with public education about prevention, recognition of signs and symptoms, and the importance of immediately seeking care. It then circles through the series of system components to emphasize evidence-based and best practices for incident recognition, first aid, 911 access, response coordination, pre-hospital response, transport, emergency department care, acute medical care, and rehabilitation. Finally, it incorporates quality improvement processes throughout the system.

The continuum model is shown below:



### ***Current Action to Implement Time Critical Diagnosis System:***

- *Promulgate regulations to designate four levels of stroke and STEMI centers and add a fourth level to the existing three levels of trauma centers. (Target date—Fall 2010)*
- *Begin expanded center designation process. (Winter 2010)*
- *Provide professional education training for hospital and out-of-hospital agencies impacted. (Spring 2010 and ongoing)*
- *Expand quality assurance system to support stroke and STEMI in addition to trauma and improve data management for performance improvement functions. (Spring 2010 and ongoing)*
- *Identify supports to expand functionality of Regional EMS Advisory Committees to advise and make recommendations to the region and the Department of Health and Senior Services on how best to coordinate regional emergency resources; improve public and professional education; develop standards, protocols and policies; engage in quality improvement activities; and support cooperative research endeavors to improve emergency medical care in Missouri. (Spring 2010)*
- *Secure funding to establish and sustain an evaluation mechanism. (Fall 2010)*
- *Coordinate efforts for public education and prevention of injury, coronary heart disease and stroke. (Spring 2010)*

The TCD system allows resource sharing and coordination at many different levels to decrease duplication and costs for services similar for each condition (e.g., 911 and emergency medical dispatch, pre-hospital response and transport, center designation process for hospitals that meet regulatory criteria); while supporting the unique and distinct care required by each condition (e.g., assessment, diagnosis and treatment by those hospitals that meet specific care and capacity requirements for specialty center designation).

The experiences and results from numerous other states and regionalized models demonstrate both the feasibility of actual and potential benefits from a systemized approach to emergency medical care for trauma, stroke and STEMI. The TCD system in Missouri, however, further advances the concept by creating an umbrella system for the time critical care of conditions—stroke, STEMI, trauma and other potential conditions for which future advances will warrant time critical care. While other states have organized responses to each of these conditions, independently, no state has approached them on such an integrated systems level as represented by the Missouri system.

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